Article

Consumer preferences for meathybrids - Empirical findings from Belgium

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Abstract: High levels of meat consumption are increasingly being criticised for ethical, environmental, and social reasons. Plant-based meat substitutes have been identified as healthy sources of protein in comparison to meat. This alternative offers several social, environmental and health benefits and may play a role in reducing meat consumption. However, there has been a lack of research on how specific meat substitute attributes can influence consumers to replace or partially replace meat in their diets. Research demonstrates that in many countries consumers are highly attached to meat.They consider it as an essential and integral element of their daily diet. For these consumers which are not interested in vegan or vegetarian alternatives to meat, so-called meathybrids could be a low-threshold option for a more sustainable food consumption behaviour. In meathybrids only a fraction of the meat product (e.g. 20% to 50%) is replaced with plant-based proteins. In this paper, the results of an online survey with 501 Belgium consumers are presented with focus on preferences and attitudes relating to meathyrids. The results show that more than fifty percent of consumers substitute meat at least occasionally. Thus, about half of the respondents reveal an eligible consumption behaviour in respect to sustainability and healthiness to a certain degree. Concerning the determinants of choosing either meathybrid or meat it becomes evident that a strong effect is exerted by the health perception. The healthier meathybrids are perceived, the higher is the choice probability. Thus, this egoistic motive seems to outperform altruistic motives like animal welfare or environmental concerns when it comes to choice for this new product category.

Keywords: meat substitute; meathybrid; consumer preference, plant-based proteins

1. Introduction

There are currently more than 7 billion people on this planet, with forecasts predicting the population to grow to 9.7 billion by 2050. Securing a sustainable food supply for humankind is therefore becoming a major challenge. Diets with a high share of animal proteins must be adapted in order to ensure that demand is not outstripping production [1,2]. Furthermore, the consumption of meat and meat products in larger portions is associated with higher risks on prevalence of cardiovascular, coronary and cerebrovascular diseases, stroke, diabetes type 2 and colorectal cancer [3].

In addition to these health issues, meat production chains have a considerable impact on the environment through the use of land, application of fertilisers, greenhouse emissions, and water consumption resulting in loss of biodiversity and enhancing climate change [4–7]. Meat and meat

products are also associated with severe animal welfare issues, such as pigtail docking, poultry debeaking, calves separation and the mistreatment in slaughterhouses [8].

Diversity in eating habits are getting lost as developing countries adopt a more animal-rich, western style diet. In this context Sans and Combris[9] stated that humankind is heading for a generalization of its diet through animal proteins.

All these facts underline the importance of integrating new protein sources into the diet. However, this means overcoming barriers such as traditional meat consumption across many cultures [10]. To this effect, a promising alternative pathway is to increase the share of plant proteins in the diet. This could be done by using e.g. textured soy protein, mushroom, wheat gluten, pulses etc. as a complete substitute for animal-protein. Another opportunity is to replace only a fraction of the meat product (e.g. 20% to 50%) with plant-based proteins [11]. Research demonstrates that in many countries consumers are highly attached to meat and consider it as essential and integral element of their daily diet [12]. The above mentioned so-called "meathybrids" may be an option for the large consumer segment that is not interested in vegan or vegetarian alternatives to meat. Therefore, "meathybrids" could serve as a low-threshold offer for this group facilitating the transition in direction to a more healthy and sustainable diet.

As with many novel technologies, consumers' lack of understanding the benefits of hybrid meat products may led to scepticism and ultimately to the rejection of these. Through early integration of consumer demand and preferences into the development process, more suitable hybrid products can be designed. Understanding the decision-making process will help to develop tailored communication messages that highlight its benefits as a sustainable and healthy alternative to regular meat products. For identifying consumer preferences and attitudes for meat alternatives as e.g. "meathybrids" a representative online-survey was carried out in Belgium. Furthermore, a concise literature research was conducted.

2. Literature overview

The literature overview focused on the time period 2010-2020 for presenting the status quo of knowledge about consumer demand for meat and meat alternatives. Older articles entered the analysis only if these delivered a fundamental contribution to the research. The research databases and search engines - EBSCO host, Google Scholar, Research Gate and Science Direct were selected for literature research. The following search terms were chosen: meat consumption, food choice motives+meat, food choice & meat, meat alternatives, meat replacer, preferences & meat consumption, attitudes & consumption etc. Furthermore, in the found papers a cross-check was applied in order to identify additional papers.

2.1. Sensory

Concerning meat consumption there is a consensus that consumer preferences are in particular affected by products sensory characteristics. An inferior or low sensory quality can constitute a critical barrier for market entry of meat substitutes [13,14]. Therefore, meat substitutes respectively 'meathybrids' must catch up with real meat products concerning sensory characteristics. A study carried out by Topcu *et al.*[15] demonstrated that the sensory quality factors aroma (29.6%) and visible quality (5.3%) explained most of Turkish consumers' preferences for red meat consumption compared to hedonic factors (e.g., product image, nutritional value, cost, meat source and durability, origin of the meat). Sensory appeal often is problematic in reducing or changing meat consumption to alternatives like in vitro (cultured, lab grown, etc.) meat, eating nose-to-tail (e.g., offal, hooves, eyes etc.) or entomophagy (eating insects) [13].

2.2. Environment

The majority of Western European consumers are not aware that meat consumption has a large environmental impact [13,16]. Contrarily, Apostolidis and McLeay[17] stated that the ecological rationale for switching to meat alternatives is being recognised but cannot overcome sensory shortcomings (see above). Concerning consumer segments, Mullee *et al.*[18] found that vegetarians are more likely than semi-vegetarians to agree that meat production is bad for the environment and unhealthy.

2.3. Animal welfare

A study among Belgian consumers explored the relationship between morality and diet choice by investigating how animal and human welfare attitudes can predict a meat eating vs. flexitarian vs. vegetarian diet [19]. Results show that animal health concerns (measured via an animal attitude scale) can predict diet choice. Vegetarians are most concerned, while full-time meat eaters are least concerned. The contrast between flexitarians and vegetarians is greater than the contrast between flexitarians and full-time meat eaters.

2.4. Health

It is to highlight, that many consumers consider meat products as an important source of nutrients and a traditional component of their diet. It is generally perceived as a healthy food [20]. In the latter study a quarter of the respondents believed that eating vegetarian food frequently is unhealthy. Like in the study of De Backer and Hudders[19] omnivores associated meat with good health and disagreed that meat production is bad for the environment. Perceived healthiness has been a positive predictor of red meat consumption. Furthermore, among omnivores and flexitarians that represent a potential target group for meathybrids there are large consumer segments that consider meat substitutes as unhealthy and artificial. Thus in the communication strategy for meat substitutes the mentioned prejudice must be dealt with and re-framed.

2.5. Meat attachment

Recent findings have reinforced the idea that consumers have an affective connection towards meat that may play a role in their willingness to change consumption habits [12]. More specifically, it has been suggested that the affective connection towards meat may be a continuum in which one end refers to disgust (i.e., negative affect and repulsion, related with moral internalization), while the other shows a pattern of attachment (i.e., high positive affect and dependence towards meat, and feelings of sadness and deprivation when considering abstaining from meat consumption) that may hinder a change in consumption habits [12]. This pattern mirrors the main characteristic of the general concept of attachment, which is the presence of a positive bond and desire to maintain closeness to the object of attachment. However, the role that meat plays beyond nutrition has only recently started to receive attention, and the merit of meat attachment as a construct and measure to help increasing knowledge on the psychology of meat consumption and meat substitution is yet to be determined. In response to calls to expand knowledge on consumer willingness to reduce meat consumption and to adopt a more plant-based diet, this work advances the construct of meat attachment by describing the validation of the Meat Attachment Questionnaire (MAQ).
In this study the Meat Attachment Questionnaire of Graça *et al.*[12] was selected for measuring the psychometric construct.

2.6. Food Neophobia (FNS)

Food neophobia refers to reluctance to eat unfamiliar foods. It has been the subject of many studies over the last two decades in several countries, as it affects both the quality and variety of foods in the diet. The ability to identify population segments that have greater or lesser neophobia, thus

enabling identification of early adopters of innovative products.

More elderly consumers more likely hold negative views towards in vitro meat. They saw in vitro not as real meat, not as something natural, and hence unhealthy [14]. It is to hypothesise that possibly this finding could hold for "meathybrids" that are partly highly processed as well. According to Apostolidis and McLeay[17] low levels of acceptance for meat substitutes have been associated with high levels of the construct food neophobia.

In this study the food neophobia scale (FNS) of Pliner and Hobden[21] was selected for measuring the psychometric construct.

3. Data collection and methods of data analysis

Consumer data was collected using a quantitative online survey approach. The respondents were panelists and have been recruited by the market research company Savanta (London, UK). The questionnaire comprised questions to the general meat consumption on the one hand and on the other hand specific questions concerning preferences for meat substitutes.

The online survey was carried out in Belgium with 501 respondents. Participants had to be meat eaters and thus vegetarians and vegans were sorted out. Furthermore, the participants had to be mainly, respectively to 50% responsible for food shopping in the household

The study design and the practicability of the experiment were tested in a pretest with 20 participants. The pretest results led to slight changes in the questionnaire design. Data collection took place in the time period from 8th November until 19th November 2019 (see Table 1).

In the result section we report descriptive results. For scale development (FNS, MAQ) Cronbach's alpha is calculated and reported. For measuring FNS the list of Pliner and Hobden[21] was selected. The wording of the German version has been chosen from a study by Siegrist and Hartmann[22]. Participants answered on a five-point response scale that verbally and numerically anchored (1=totally disagree, 2=disagree, 3=neither disagree nor agree, 4=agree, 5=totally agree). The five-point scale was used instead of the originally used seven-point scale for a better display of the questionnaire on tablet and smartphones. The items indicated with (r) in Table 4 were inversely re-coded. Considering that the inclusion of invalid items creates the risk of invalid conclusions [23], a principal components analysis (Varimax rotation, eigenvalues greater than one) was carried out to explain the variability of the FNS. For MAQ participants answered on a five-point response scale that was verbally and numerically anchored (1=strongly disagree, 2=disagree, 3=neither disagree nor agree, 4=agree, 5=strongly agree). The items indicated with (r) in Table 4 were inversely re-coded. Like for the FNS a principal component analysis was carried out.

Furthermore, a multinomial logistic regression model is applied for measuring the impact of several parameters on the the choice of either a hybrid or a meat product.

3.1. Multinomial logistic regression

Multinomial logistic Regression is the regression analysis to conduct when the dependent variable is nominal with more than two levels. It is used to model nominal outcome variables, in which the log odds of the outcomes are modeled as a linear combination of the predictor variables. The multinomial logistic model belongs to the family of generalized linear models and as mentioned is used when the response variable is a categorical variable.

Suppose that variable Y_i represents the offered alternatives in a choice experiment (e.g. choice between meat and meathybrid), with $i= 1,\dots, n$ and n is the number of possible product alternatives. In case n equals 2 and Y has outcomes Y_1 and Y_2. Both the counts of Y_1 and Y_2 follow a binomial distribution. The probability of occurrence of Y_1 is π_1 and that of Y_2 is π_2. Logistic regression relates probability π_1 to a set of predictors using the logit link function:

$$logit(\pi_1) = ln(\frac{\pi_1}{\pi_2}) = ln(\frac{\pi_1}{1 - \pi_1}) = \mathbf{x}'\beta \tag{1}$$

where $\mathbf{x}$ is a vector of predictors (e.g. FNS, MAQ or buying frequency of organic meat), and β is a vector of model coefficients that are typically estimated by maximum likelihood. Equation 1 can be rewritten as:

$$\left(\frac{\pi_1}{1-\pi_1}\right) = exp(\mathbf{x}'\beta) = exp(\eta) \tag{2}$$

The quotient in Equation 2 is referred to as the odds. From Equation 2 follows that:

$$\pi_1 = \frac{exp(\eta)}{1 + exp(\eta)} \tag{3}$$

The binomial logistic regression model is easily generalized to the multinomial case. If there are n product alternatives there are also n variables $Y_1, \ldots, Y_n$ with corresponding probabilities of occurrence $\pi_1, \ldots, \pi_n$. Analogous to binomial logistic regression the odds $\pi_1/\pi_n, \ldots, \pi_n - 1/\pi_n$ are modelled by means of $exp(\eta_1), \ldots, exp(\eta_{n-1})$. From $\sum_{i=1}^{n} \pi_i = 1$ it follows that:

$$\pi_1 = \frac{exp(\eta_i)}{exp(\eta_1) + exp(\eta_2) + \ldots + exp(\eta_n)} \tag{4}$$

where $exp(\eta_n) = 0$. This model ensures that all probabilities are in the interval [0,1] and that the probabilities sum to 1. In this paper the dependent variable is taken from a comparison task where respondents had to indicate if they would either choose meat, the meathybrid alternative or none (neither/nor) of these options. The FNS and MAQ-scale as well as other parameters entered the regression analysis as independent variables. These independent variables are the buying frequency of organic/free range meat, the buying frequency of plant-based alternatives and the evaluation if either meathybrid or meat is perceived as healthier, better for the environment, more tasty or better for the environment.

Given the theoretical background, data was modelled according to the following expression:

$$
\begin{aligned}
\mathbf{x}'\beta = \ & \text{buy.freq. organic/free range} * \beta_1 \\
& + \text{healthier} * \beta_2 \\
& + \text{more tasty} * \beta_3 \\
& + \text{better for the environment} * \beta_4 \\
& + \text{better for animal welfare} * \beta_5 \\
& + \text{FNS} * \beta_6 \\
& + \text{MAQ} * \beta_7 \\
& + \text{buy.freq. plant-based alternatives} * \beta_8 \\
& + constant
\end{aligned} \tag{5}
$$

The above mentioned parameters are estimated for meathybrid (Y_1) and the "none"-option (Y_2) whereas meat (Y_3) was set as reference category in the estimation. In this study for estimating the specified model the software R [24] and the package mlogit [25] were used.

4. Results

4.1. General buying behaviour

At the beginning of the questionnaire the participants had to indicate where they buy most of their meat products. The classical retailer took the first position (45.5%) followed by discount shops (23.6%). Butcheries were on third position (23.0%). All other options were only of minor importance (see Figure 1).

| attribute	characteristics	n	%
gender	Male	245	48.9
	Female	256	51.1
federal state	Bruxelles	62	12.4
	Brabant wallon	27	5.4
	Hainaut	68	13.6
	Liège	44	8.8
	Luxembourg	13	2.6
	Namur	27	5.4
	Antwerpen	88	17.6
	Provincie Limb.	20	4.0
	Oost-Vlaand.	58	11.6
	Vlaams-Brab.	60	11.9
	West-Vlaand.	34	6.8
age	< 25 years	59	11.8
	25-34 years	94	18.8
	35-44 years	100	20.0
	45-54 years	99	19.8
	55-64 years	71	14.2
	> 64 years	78	15.6
education	no school qualifications	22	4.4
	Still in school	18	3.6
	Junior High Diploma	20	4.0
	High school diploma	229	45.7
	University-entrance diploma	78	15.6
	Bachelor or Master degree	122	24.4
	Other degree:	12	2.4
net income	no income	39	7.8
	Less than 500	19	3.8
	500 up to 1.000	36	7.2
	1.000 up to 1.500	98	19.6
	1.500 up to 2.000	115	23.0
	2.000 up to 2.500	89	17.8
	2.500 up to 3.000	38	7.6
	3.000 up to 3.500	27	5.4
	3.500 up to 4.000	23	4.6
	4.000 or more	17	3.4
household size	1	112	22.4
	2	164	32.7
	3	96	19.2
	4	82	16.4
	5	33	6.6
	6	9	1.8
	>6	5	1.0

Table 1. Sample
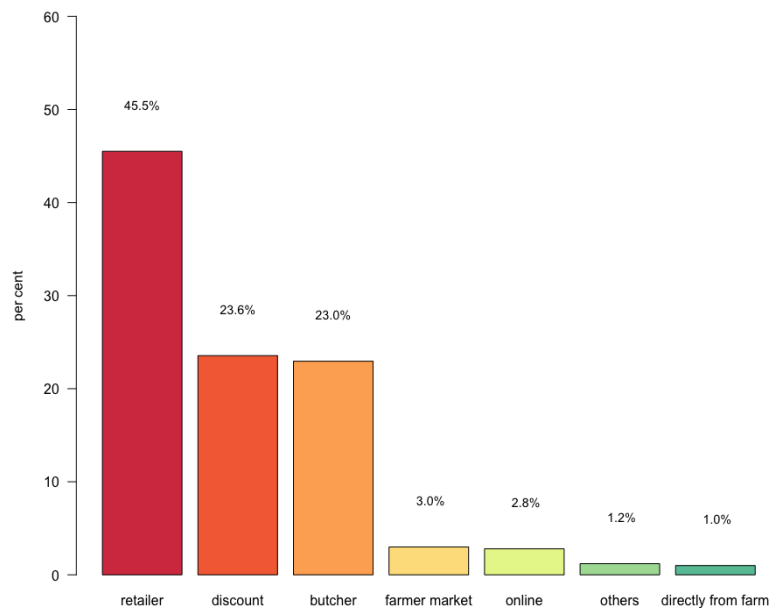
Figure 1. Preferred buying location of meat/meat products

Furthermore, respondents were asked for their buying frequency of organic respectively meat from free-range production. About 18% of the participants indicated to buy such products often (15.2%) or always (3.0%)(see Table 2).

	%
never	24.4
sometimes	57.7
often	15.2
always	3.0

Table 2. Buying frequency organic/free-range meat

4.2. Meat Attachement Questionnaire (MAQ) and Food Neophobia Scale (FNS)

Reliability analysis for the global MAQ showed a high internal consistency with a standardized Cronbach's α of .86. In comparison to [12] we received higher values for the non-reversed items and lower values for the reversed item what is due to the fact that vegans and vegetarians were not part of this study (see Table 3). On average respondents agree to all of the statements. The highest means received the statements the reverse-coded item "Meat reminds me of diseases" (3.70) and the statement "I love meals with meat"(3.69). This evaluation demonstrates that most of the respondents consider meat not as an unhealthy product but as an essential part of their diet.

The Food Neophobia Scale showed a high internal consistency with a standardized Cronbach's α of .76. Overall the respondents show a relatively high level of FNS.

For use in the regression analysis the individual scores, that is the z-standardised mean value across the items, were calculated.

statement	std. α	$\overline{x}$	σ
I love meals with meat.	0.84	3.69	1.03
To eat meat is one of the good pleasures in life.	0.84	3.36	1.10
I'm a big fan of meat.	0.84	3.58	1.07
A good steak is without comparison.	0.85	3.43	1.13
By eating meat I'm reminded of the death and suffering of animals.(r)	0.87	3.42	1.25
To eat meat is disrespectful towards life and the environment.(r)	0.87	3.23	1.12
Meat reminds me of diseases.(r)	0.87	3.70	1.15
To eat meat is an unquestionable right of every person.	0.86	3.60	1.05
According to our position in the food chain, we have the right to eat meat.	0.87	3.33	1.20
Eating meat is a natural and indisputable practice.	0.85	3.58	1.00
I don't picture myself without eating meat regularly.	0.85	3.44	1.10
If I couldn't eat meat I would feel weak.	0.85	3.07	1.07
I would feel fine with a meatless diet.(r)	0.86	3.11	1.11
If I was forced to stop eating meat I would feel sad.	0.85	3.35	1.14
Meat is irreplaceable in my diet.	0.85	3.29	1.02

Note: 5-point Likert scale: 1=strongly disagree, 2=disagree, 3=neither disagree nor agree, 4=agree, 5=strongly agree)

Table 3. Meat attachment questionnaire scale (MAQ)

statement	std. α	$\overline{x}$	σ
I am constantly sampling new and different food. (r)	0.74	2.79	1.14
I do not trust new (different or innovative) food.	0.75	2.81	1.05
If I don't know what a food is, I won't try it.	0.75	3.16	1.08
I prefer food from different cultures. (r)	0.75	2.92	1.03
I am reluctant to eat foreign food that I see for the first time.	0.72	2.86	1.17
If I go to a buffet, meetings or parties, I'll eat new food. (r)	0.73	2.45	0.99
I'm afraid to eat food that I did not eat before.	0.72	2.66	1.18
I am very particular about the food I eat.	0.74	3.00	1.26
I will eat almost anything. (r)	0.75	2.67	1.20
I like to try new ethnic restaurants. (r)	0.73	2.61	1.07

Note: 5-point Likert scale: 1=totally disagree, 2=disagree, 3=neither disagree nor agree, 4=agree, 5=totally agree)

Table 4. Food neophobia scale (FNS)

4.3. Consumption of substitutes

The survey questionnaire comprehended several direct questions about the consumption of meat substitutes. In this context respondents were asked if they deliberately substitute meat on the days they do not eat meat. In this context a high proportion of 58.7% of the respondents stated to choose consciously meatless alternatives (see Figure 2).

Subsequently, this group had to indicate with which products they concretely substitute meat. For this purpose they received a list of twelve products from that up to three products could be chosen. The option fish was selected by 66.7% of this segment, followed by eggs (58.8%), pasta (36.7%), cheese (29.6%) and salad (16.7%) as most preferred substitutes (see Table 5). It is to highlight that the top three on the list are non-vegan alternatives whereas vegan alternatives like protein-rich lentils, tofu, or seitan were only of minor importance.

Additionally, all respondents were asked how often they buy plant-based meat substitutes, such as veggie burgers. Interestingly, only 4.4% indicated to consume such products frequently whereas 16.6% stated to do so at least sometimes (see Table 6).

4.4. Comparison meat vs. meathybrid

In order to analyse the preference for meathybrids in more detail respondents received a comparison task. The question for this task was: "Consider a food product made of 100% meat
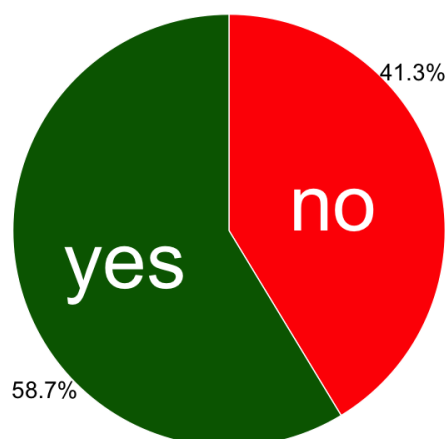
Figure 2. deliberately substitute meat on the days they do not eat meat

nr product	%
1 Fish	66.7
2 Egg(s)	58.8
3 Pasta	36.7
4 Cheese	29.6
5 Salad	16.7
6 Lentils	10.9
7 Nuts	6.5
8 Other legumes	5.4
9 Tofu	5.1
10 Other	2.3
11 Tempeh	1.0
12 Seitan	0.7

Table 5. Ranking list consumed meat alternatives

and a comparable food product made of 60% meat and 40% plant-based proteins. Which product do you think is ...

- healthier?
- tastier?
- more expensive ?
- better for the environment?
- better for animal welfare?

Subsequently, respondents had to indicate if they would pay more either for a meathybrid or meat respectively if they would choose either a meathybrid or a meat product. Concerning the parameters health, environment and animal welfare the meathybrid was evaluated much better then the meat option (see Table 7). Contrarily, meat was perceived as tastier in comparison to the meathybrid by 62.7% of the respondents. Concerning the willingness-to-pay more for a product only 20.6% of the interviewees named the meathybrid option and likewise only 28.5% indicated to choose the meathybrid in the direct comparison. It is to highlight that the sample considered meat (45.3%) as healthier compared to the hybrid alternative (40.3%). It appears as if the meaning to this topic is quite polarized in the population.

	%
never	41.3
tried it once	14.6
rarely	23.2
sometimes	16.6
frequently	4.4

Table 6. Frequency of consumption of meat alternatives such as veggie burgers

	meat	neither/nor	hybrid
healthier	**45.3%**	14.4%	40.3%
tastier	**62.7%**	14.0%	23.4%
more expensive	36.5%	18.0%	**45.6%**
better for environment	22.6%	24.2%	**53.3%**
better for animal welfare	20.2%	28.9%	**50.9%**
I would pay more for ...	37.1%	**42.3%**	20.6%
I would choose ...	**62.5%**	9.0%	**28.5%**

Table 7. Comparison meat vs. hybrid

4.5. Multinomial logit regression analysis

In the multinomial regression analysis, it was explored whether the MAQ and the FNS have an impact on the choice decision in the questionnaire. In the mentioned choice task the respondents were directly asked if they would either choose the meat or the hybrid product or none of these products (see section before). Furthermore, the results respectively parameters from the direct comparison (health, taste, environment, animal welfare) between meat and hybrid entered the regression as independent variables as well as the buying frequency of organic/free range meat and the buying frequency of plant-based alternatives (like veggie burger).

The parameters from the direct comparison were recoded so that +1 reflects the choice of the hybrid (e.g. as more healthy, better for the environment, ...), -1 the choice of meat and zero the choice of the option "neither/nor" (see section before). As reference category for the multinomial logit model the meat option was chosen.

The regression model was checked for indications of multicollinearity by examining the condition index. Values greater than 30 are typically considered as problematic [26]. No violations of limits were found.

The MAQ-results reveal that the more meat attached the interviewees are, the higher is the probability not to choose the hybrid option (-.394***)(see Table 8). On the other hand the extent of food neophobia exerts no significant effect on this alternative (.216). The same holds for the buying frequency of organic respectively meat from free range production (-.016).

If respondents evaluated the hybrid as healthier or better for the environment in the comparison task the choice probability for this option increased significantly. In this context it is to highlight that the taste and health perception have by far the strongest impact (1.218*** resp. 1.194***) whereas the effect for the environmental perception is roughly only a third of this size. With increasing buying frequency of plant-based meat alternatives like e.g. veggie burgers likewise the choice probability of the hybrid option increases (.441***). Interestingly, the animal welfare evaluation of hybrids in the comparison task has no impact on the choice of this product type.

5. Discussion

The results show that more than fifty percent of consumers substitute meat at least occasionally. Thus about half of the respondents reveal an eligible consumption behavior in respect to sustainability and healthiness at least sometimes. Furthermore, about 20% indicated to consume sometimes

Table 8. Multinomial logit regression - Results

	Dependent variable:	
	hybrid	neiter/nor
	(1)	(2)
buy. freq. organic/free range	−0.016	−0.637***
	(0.135)	(0.205)
healthier	1.194***	0.634***
	(0.180)	(0.231)
more tasty	1.218***	1.046***
	(0.171)	(0.220)
better for environment	0.481**	−0.271
	(0.206)	(0.263)
better for animal welfare	0.183	−0.129
	(0.210)	(0.268)
Food Neophobia Scale	0.216	0.503
	(0.223)	(0.324)
MEAS	−0.394***	−0.776***
	(0.144)	(0.194)
buy. freq. plant-based alt.	0.441***	−0.014
	(0.135)	(0.201)
Constant	−1.625**	−3.231***
	(0.668)	(0.980)
Akaike Inf. Crit.	665.913	665.913
Note:	*p<0.1; **p<0.05; ***p<0.01	

respectively frequently meat alternatives such as veggie burgers. In the carried out direct comparison between meat and meathybrids about 28.5% of the respondents choose the latter alternative. These findings demonstrates that a significant amount of consumers is open-minded to the meathybrid concept. Even a higher share believes that this alternative is healthier, better for the environment and animal welfare in comparison to meat whereas it is perceived as more expensive at the same time.

Concerning the impact factors on choosing either a meathybrid or meat it becomes obvious that the perception of meathybrids as more environment-friendly product positively influence the choice decision. Likewise, a strong effect is exerted by the health perception. The healthier meathybrids are perceived the higher is the choice probability. Thus this egoistic motive seems to outperform altruistic motives when it comes to choice. In this line, it is to recommend to lay an emphasis on healthy characteristics of meathybrids in product marketing for a successful market entry. These can be used as unique selling proposition (USP) against competitors.

With regard to consumer segments, it can be stated that there is no advantage in focusing on organic buyers as a target group. Across all respondents the parameter buying frequency of organic or meat from free range production had no impact on the choice of a meathybrid product.

Concerning the analysed scales, it can be stated that there is no problem with food neophobia when it comes to meathyrids. Individual's degree of food neophobia exerts no effect on the choice of this product category. Thus, it can be assumed that meathybrids are not perceived as 'exotic', 'neo' or 'artificial' as for example burgers based on insects or cultured meat where FNS is a big barrier.

In contrast, the findings for the MAQ-scale show that the more consumers are attached to meat the lower is the choice probability for choosing meathybrids. Thus for the segment of highly meat attached consumer this alternative is no option. Obviously, meat attachment as a psychological construct represents a barrier for diet change and transition. Future research should address this topic, and analyse how to overcome this attitude.

Nonetheless, the findings demonstrate that the scepticism of consumers of mixing meat and plant protein has been greatly reduced in recent years. The feeling that the food industry is just willing to increase their turnover by using cheap plant protein in the meat formulation has obviously disappeared. It is to highlight that meathybrids are even perceived as healthier in comparison to meat.

Thus, consumers are nowadays accustomed to found e.g. peas no longer in their original form in foods but also as protein powder. Therefore, the development of hybrid products, which could serve the consumer with the best of both, animal and plant source, will enable all different kinds of consumer groups. This will support all the industrial fields named to get valorisation of high-quality new hybrid products.

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